

APPENDIX A

State of Washington National Pollution Discharge Elimination System (NPDES) Requirements

Summary of Current Effluent Limitations and Monitoring Requirements (a)

CHEMICAL MONITORING

Effluent Characteristic	Discharge Limitation		Monitoring Requirements		
	Daily Maximum (ug/L)	Monthly Average (ug/L)	Measurement Frequency	Sample Type	Reported Value(s)
Total of 16 Polynuclear Aromatic Hydrocarbons (PAHs)	20	--	Once per week	24-hour composite (c)	Maximum daily
Individual PAHs (b)					
Naphthalene	4	--	Once per week	24-hour composite	Maximum daily
Acenaphthylene	4	--	Once per week	24-hour composite	Maximum daily
Acenaphthene	4	--	Once per week	24-hour composite	Maximum daily
Fluorene	2	--	Once per week	24-hour composite	Maximum daily
Phenanthrene	2	--	Once per week	24-hour composite	Maximum daily
Anthracene	2	--	Once per week	24-hour composite	Maximum daily
Fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Pyrene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(a)anthracene	2	--	Once per week	24-hour composite	Maximum daily
Chrysene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(b)fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(k)fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(a)pyrene	2	--	Once per week	24-hour composite	Maximum daily
Dibenzo(a,h)anthracene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(g,h,i)perylene	2	--	Once per week	24-hour composite	Maximum daily
Indeno(1,2,3-cd)pyrene	2	--	Once per week	24-hour composite	Maximum daily
Pentachlorophenol (d)	6	--	Once per week	24-hour composite	Maximum daily
Discharge Flow (gpm) (e)	NA	--	Continuous	Recording	Maximum daily
Total Suspended Solids [TSS] (mg/L)	NA	--	Once per week	24-hour composite	Maximum daily
Total Dissolved Solids [TDS] (mg/L)	NA	--	Once per week	Grab	Maximum daily
Temperature [degrees C]	NA	--	Once per week	Grab	Maximum daily
Dissolved Oxygen [DO] (mg/L)	NA	--	Once per week	Grab	Maximum daily
pH	6.0 - 9.0	--	Once per week	Grab	Maximum daily
Metals (f)					
Zinc	95	47	Once per week	24-hour composite	Maximum daily
Lead	140	70	Once per week	24-hour composite	Maximum daily
Mercury	2.1	1	Once per week	24-hour composite	Maximum daily
Nickel	75	37	Once per week	24-hour composite	Maximum daily
Cadmium	43	21	Once per week	24-hour composite	Maximum daily
Chromium (Total)	1100	548	Once per week	24-hour composite	Maximum daily

BIOMONITORING (g)

Organism	Type of Toxicity Test	Monitoring Requirements		
		Measurement Frequency	Sample Type	Reported Value(s)
Inland Silversides (Menidia beryllina)	Acute survival test	Quarterly	24-hour composite	LC50
Purple sea urchin or sand dollar (h)	Chronic test	Quarterly	24-hour composite	IC25
Pacific oyster or mussel larvae (h)	Chronic test	Quarterly	24-hour composite	NOEC, LOEC, EC50/LC50

Notes:

- (a) Modified from EPA's Administrative Order for Necessary Interim Response Actions No. 1091-06-03-106 dated June 17, 1991.
- (b) Each of the 16 priority pollutants PAHs are quantified separately using EPA Method 8310 from Test Methods for Evaluating Solid Waste, Third Edition, SW-846. The 16 individual PAHs are summed to arrive at the total PAH value.
- (c) A 24 hour composite sample is collected using an automatic sampler.
- (d) Pentachlorophenol is quantified using EPA Method 8040 from Test Methods for Evaluating Solid Waste, Third Edition, SW-846.
- (e) Flow is measured by a continuous flow meter.
- (f) Metals are quantified using EPA Contract Laboratory Program (CLP) analytical methods and QA/QC, however full documentation is not required. Documentation only includes calibration, blank, accuracy, and precision results.
- (g) Specific requirements for analytical methods, QA/QC, and reporting are provided in the attached fact sheet.
- (h) These organisms may be used interchangeably if required.

Reference: Interim ROD
 Wyckoff Groundwater Operable Unit
 Wyckoff/Eagle Harbor Superfund Site
 September 30, 1994

Current Biomonitoring Requirements

I. Acute Toxicity Test Requirements:

1. For each test period (see also Paragraph I.8 below), acute survival toxicity tests are required for Inland Silversides (*Menidia beryllina*).
 2. The test protocol is adapted from C.I. Weber, et al, *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*. EPA/600/4-90/027, 1991.
 3. All quality assurance criteria used are in accordance with *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, EPA/600/4-90/027. Test results which are not valid (e.g., control mortality exceeds acceptable level) will not be accepted and must be repeated.
 4. The test is performed with a series of dilutions (100, 50, 25, 12.5, and 6.25 percent effluent) plus a control (0 percent effluent) to determine (1) the LC₅₀, and (2) any statistically significant differences between the results for the control and each effluent concentration tested.
 5. If the test demonstrates the presence of acute toxicity, EPA will undertake the following actions as needed to determine the source of toxicity:
 - (a) Chemical analyses.
 - (b) Evaluation of treatment processes and chemicals used.
 - (c) Physical inspection of facility for proper operation of treatment units, spills, etc.
 - (d) Examination of records.
 - (e) Interviews with plant personnel to determine if toxicant releases occurred through spills, unusual operating conditions, etc.
- If any toxicity remains after conducting the above steps, additional monitoring or treatment may be required.
6. A written report of the toxicity test results and any related source investigation are prepared for EPA within 60 days after the initial sampling. The report of the toxicity test results and chemical analyses shall be prepared in accordance with the Reporting Sections in the documents specified above in Section I-3.
 7. Chemical testing for the parameters for which effluent limitations exist shall be performed on a split of each sample collected for bioassay testing. To the extent that the timing of sample collection coincides with that of the sampling required for the effluent limitations, analysis of the split sample will fulfill the requirements of that monitoring as well.
 8. Testing shall be conducted every three months (4 times per year), until EPA modifies this requirement in writing. Additional toxicity testing is also required at any time that spills or other unusual events result in different or substantially increased discharge of pollutants.

II. Chronic Toxicity Test Requirements:

1. For each test period (see also Paragraph II.11 below), chronic toxicity tests are required for the following organisms:
 - (a) *Strongylocentrotus purpuratus* (purple sea urchin), or *Dendraster excentricus* (sand dollar).
 - (b) *Mytilus edulis* (mussel) or *Crassostrea gigas* (Pacific oyster) larvae.

The purple sea urchin and sand dollar, and the mussel and Pacific oyster may be used interchangeably if necessary.
2. In each year, the bioassay tests shall be conducted four times with each organism during the organism's natural spawning period. To the extent that these seasons overlap, testing shall be conducted on splits of the same effluent samples. Any tests which fail the criteria for control mortality as specified in the respective protocols shall be repeated on a freshly collected sample.
3. Testing is conducted on 24-hour composite samples of effluent. Each composite sample collected shall be large enough to provide enough effluent to conduct toxicity tests, as well as chemical tests required in Part II.10. below.

4. The chronic toxicity tests are performed as follows:
 - (a) For the purple sea urchin/sand dollar, tests are performed on a series of dilutions, plus a control (0 percent effluent). The IC_{25} value (the incipient concentration of effluent causing a 25 percent reduction in biological measurement, e.g., fertilization, is calculated. EPA has indicated that the IC_{25} is the approximate analogue to the no observable effect concentration (NOEC) of the effluent in the control water. The NOEC is that concentration of effluent for which survival, reproduction, or growth of the test organisms is not significantly different (at the 95% confidence level) from that of the control organisms (see *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001, March 1991).
 - (b) For the mussel or Pacific oyster larvae, tests are performed on a series of dilutions, plus a control (0 percent effluent). The NOEC, LOEC (lowest observable effect concentration), and the EC50/LC50 (effective concentration [EC] at which 50 percent of the population shows sublethal effects such as reduction in growth and lethal concentration [LC] at which 50 percent of the population dies, respectively), are calculated.
5. The chronic bioassays are conducted in accordance with the following protocols:
 - (a) For purple sea urchin/sand dollar: *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, EPA/600/4-87/028 and The Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1988.
 - (b) For mussel/Pacific oyster larvae: *Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs*, ASTM E 724-89.
6. All quality assurance criteria used shall be in accordance with *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, EPA/600/4-85-013, *Quality Assurance Guidelines for Biological Testing*, EPA/600/4-78-043, and for oyster/mussel larvae test, *Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs*, ASTM E 724-89. The control water shall be high quality natural seawater. No exceptions will be made for artificial sea salts or concentrated brine unless Wyckoff submits data to EPA which demonstrates that the lab has reliably conducted the specified test with one of these media.
7. The results of the bioassay tests are provided to EPA within 45 days after completion of each test in accordance with the Reporting Section in *Short Term Methods for Estimating Chronic Toxicity Effluents and Receiving Water to Marine and Estuarine Organisms*, EPA/600/4-87/028, May 1988, and include any other information required by the protocols.
8. EPA and Ecology will evaluate the results to determine whether they indicate the occurrence of chronic toxicity outside the mixing zone. If it appears that this may be occurring, a toxicity evaluation and reduction plan will be prepared within 90 days. The evaluation portion of the plan may include additional toxicity testing if needed to follow up on initial results or gather information for a possible toxicity limit in the future.
9. If the sea urchin/sand dollar or mussel/oyster larvae tests prove inadequate for evaluating Wyckoff's effluent, EPA may substitute alternative tests which will provide the required toxicity information.
10. Chemical testing for the parameters for which effluent limitations exist shall be performed on a split of each sample collected for bioassay testing. To the extent that the timing of sample collection coincides with that of the sampling required for the effluent limitations, analysis of split sample will fulfill the requirements of that monitoring as well.
11. After one year, EPA may reduce the monitoring requirements to once per year, using the more sensitive species. All modifications will be approved by EPA in writing.

**Modifications to the Current Effluent Limitations
Wyckoff Thermal Remediation
Pilot Study Treatment System¹**

The following modifications will be made to the Chemical and/or Biomonitoring requirements:

1. Remove metals (zinc, lead, mercury, nickel, cadmium, and chromium) as a monitoring requirement. Metals was not used during wood-preserving operations at the Wyckoff/Eagle Harbor site. Additionally, years of sampling never detected metals in the treatment plant effluent.
2. Temperature will be monitored. Ecology believes an effluent temperature discharge of 20°C (68°F) to 25°C (77°F) would not cause a water quality violation in receiving waters of Puget Sound. A mixing zone has been established at the point of discharge. Grab samples for temperature monitoring will be taken once per week.
3. Dissolved oxygen (DO) and turbidity will also be monitored by grab samples once per week. The daily maximum discharge limitations are:

DO: Shall exceed 6 mg/L
 (the receiving waters of Puget Sound off Wyckoff are considered to be Class A Marine Water)

Turbidity: If background is < 50 ntu, discharge cannot exceed background plus 5 ntu
 If background is > 50 ntu, discharge cannot exceed a 10% increase

4. The following Measurement Frequency will be employed during the first three months of pilot study operation:
 - Daily effluent sampling for weeks 0 to 2
 - Twice a week for week 2 to month 3
 - Biomonitoring at month 3

Based on the results of the sampling data, the Measurement Frequency will be adjusted as appropriate after month 3. Any sampling adjustments made shall be no less than once per week for effluent chemical monitoring and quarterly for biomonitoring, for the remainder of the pilot study.

The above modifications will be employed during the thermal pilot study. Effluent Limitations will be developed/adjusted for the full-scale treatment system based on the results of the pilot study, as appropriate.

¹ Per agreement by the EPA Project Manager, Hanh Gold, and the Ecology Project Managers, Guy Barrett and Marian Abbett on February 2, 2000, and during subsequent communications on February 8 and 10, 2000.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

October 14, 1994

Reply To
Attn Of: HW-113

Guy Barrett
Toxics Cleanup Program
Washington Department of Ecology
P.O. Box 47600
Lacey, Washington 98504-7600

Re: Wyckoff GWTP Final Effluent Biomonitoring
Response to Ecology's October 4, 1994 Comments

Dear Mr. Barrett:

The U.S Environmental Protection Agency (EPA) has reviewed Ecology's comments on the proposed biomonitoring requirements for the effluent discharge of the Wyckoff Groundwater Treatment Plant and has the attached responses.

In response to these comments, attached please also find a new version of the proposed biomonitoring requirements. The changes are three-fold: (1) Per Comment 2, *Mytilus edulis* is changed to *Mytilus Sp.*; (2) per Comments 4 and 6, the reporting requirements for the toxicity tests are standardized to NOEC, LOEC, and LC₅₀ for the acute test and NOEC, LOEC, and EC₅₀ for the chronic test; and (3) per Comment 5, we added the method references plus the PTI (1994) reference.

The remaining comments (1 and 3) do not affect the initial toxicity testing requirements. Comment 1 addresses data interpretation, in which reporting requirements will be provided per Comments 4 and 6. Comment 3 addresses re-testing requirements, which will be assessed following determination of initial test results.

Please feel free to call me at (206) 553-0171 with questions or concerns regarding this matter.

Sincerely,

A handwritten signature in cursive script, reading "Christina Ngo", is positioned above the typed name.

Christina Ngo
Project Manager

Attachments

15.10.1-0003

**WYCKOFF GWTP FINAL EFFLUENT BIOMONITORING
RESPONSE TO ECOLOGY'S COMMENTS**

Comment No. 1: Section I, number 5: How is the presence of the acute toxicity to be demonstrated? A strict definition from WAC 173-205 states that "For acute toxicity, the performance standard is the median survival in one hundred percent effluent being equal to or greater than eighty percent and no individual test results showing less than sixty-five percent survival in one hundred percent effluent." Another way of determining this is having the ACEC meeting a statistically significant difference test.

Response: The presence of acute toxicity will be evaluated as follows: If there is no statistically significant difference in response between the ACEC and a control, as determined by the acute statistical power standard, then the test passes.

The presence of chronic toxicity will be evaluated as follows: If there is no statistically significant difference in response between the CCEC and a control, as determined by the chronic statistical power standard, then the test passes. [Note: Section II, Number 8 will be revised to indicate this.]

It is our understanding that the whole effluent performance standards for acute and chronic toxicity are the criteria used to remove discharge permit requirements for toxicity testing. Test results will also be compared to these criteria, but the criteria will not be used to determine if the test passes or not.

Comment No. 2: Section II, number 1(b): *Mytilus edulis* (mussel) is difficult to determine since there are apparently three very similar species in Puget Sound. *Edulis* should be replaced with "Sp." The second sentence is a contradiction since testing must switch back and forth throughout the year (the Pacific Oyster apparently never actually spawns naturally in Washington).

Response: Mytilus edulis will be replaced with Mytilus Sp. and the second sentence will be deleted.

Comment No. 3: Section II, number 2: It would be difficult to perform bioassay tests four times a year on a specific species since some natural spawning periods may only be two weeks in duration. Remove all references to natural spawning since laboratories condition critters to spawn for longer periods than would naturally occur. When seasons overlap, only one test is necessary to save costs unless some type of comparison is being made. In the third sentence, the "control mortality" should actually be "control performance" (for instance percent fertilization). Perhaps the first two sentences should be deleted leaving only the third.

Response: The first two sentences will be deleted and the third sentence will be revised per the comment.

Comment No. 4: Section II, Number 4: The IC25 value is not used by the State.

Response: The NOEC, LOEC, and LC50 will be calculated for the acute toxicity test and the NOEC, LOEC, and EC50 will be calculated for the chronic tests.

Comment No. 5: Section II, number 5: The PTI, 1994 document describing these protocols should be followed. The method described in (a) does not include either the purple sea urchin or the sand dollar. There is also no test data presented. Ecology suggests that this should be changed by adding "as per PTI, 1994" at the end of (a) and (b).

Response: Revisions will be made per the comment.

Comment No. 6: Table 2C: The biomonitoring reported value(s) of LC50 and IC25 are inadequate. NOEC would be a more appropriate method. If NOEC is greater than or equal to the ACEC then it passes for the Inland Silversides. If NOEC is greater than or equal to the CCEC for the purple sea urchin or sand dollar then it also passes. As stated in number 1 however, performance standards can also be used. Ecology recommends that a mixing zone be established so the NOEC's and testing results can be compared. An effluent characterization based on quarterly testing for one year can then be compared to the mixing zone study to see if toxicity limits need to be set. If little or no toxicity is demonstrated, the monitoring testing frequency could then be reduced. The effluent characterization should include the percent survival in 100% effluent, NOEC in acute tests, and NOEC for chronic tests. Laboratories often set effluent at 6.5% but this may not represent in-situ conditions. Therefore, the laboratory should start effluent dilution at 2% or 4% on the low end, as the substitute for the affect level, once it is determined.

Response: Per the response to Comment No. 4, the reporting requirements for the toxicity tests will be standardized to NOEC, LOEC, and LC₅₀ for the acute test and NOEC, LOEC, and EC₅₀ for the chronic test. These results will then be compared to the ACEC and CCEC, respectively. The ACEC and CCEC will be calculated based on the mixing zone definitions in WAC 173-205-020 and WAC 173-201A-100. EPA models UDKHDEN and UMERGE will be used to predict dilutions at the acute and chronic mixing zone boundaries. The results will also be compared to the performance standards, however this comparison will not be used to determine if the test has passed or failed. Regarding, the .5 dilution series (100, 50, 25, 12.5, 6.25 plus a control [0 percent effluent]), we propose that we begin testing using the 6.25 dilution as the lowest dilution because, although NOECs the past have occasionally been below 6.25% effluent, recent data (i.e., July 1991 through June 1993) indicate that all but one of the NOECs (5% for the Pacific Oyster test conducted in October 1992) have been well above 6.25% effluent. If NOECs are less than 6.25% during initial testing, a .3 series (100, 30, 10, 3, 1) will be used for the affected species.

General Comment: First page, third paragraph: In addition, the quality of the water being used by the lab has probably been the cause of bioassay failure, not the type of animal itself. A quantity of clean marine water can undergo a freezing technique which will enable a laboratory to obtain a hyper-saline brine so as to allow successful completion of testing.

Response: We are unsure about the context of this comment but assume it has something to do with using sea salts versus a brine to adjust salinity in the effluent samples. The only way to adjust the salinity in a 100% effluent is to use sea salts (and use a sea salt control). If 100% effluent testing is not required, then a brine may be used to adjust salinity.

Table 2
Summary of Current Effluent Limitations and Monitoring Requirements (a)

CHEMICAL MONITORING

Effluent Characteristic	Discharge Limitation		Monitoring Requirements		
	Daily Maximum (ug/L)	Monthly Average (ug/L)	Measurement Frequency	Sample Type	Reported Value(s)
Total of 16 Polynuclear Aromatic Hydrocarbons (PAHs)	20	—	Once per week	24-hour composite (c)	Maximum daily
Individual PAHs (b)					
Naphthalene	4	—	Once per week	24-hour composite	Maximum daily
Acenaphthylene	4	—	Once per week	24-hour composite	Maximum daily
Acenaphthene	4	—	Once per week	24-hour composite	Maximum daily
Fluorene	2	—	Once per week	24-hour composite	Maximum daily
Phenanthrene	2	—	Once per week	24-hour composite	Maximum daily
Anthracene	2	—	Once per week	24-hour composite	Maximum daily
Fluoranthene	2	—	Once per week	24-hour composite	Maximum daily
Pyrene	2	—	Once per week	24-hour composite	Maximum daily
Benzo(a)anthracene	2	—	Once per week	24-hour composite	Maximum daily
Chrysene	2	—	Once per week	24-hour composite	Maximum daily
Benzo(b)fluoranthene	2	—	Once per week	24-hour composite	Maximum daily
Benzo(k)fluoranthene	2	—	Once per week	24-hour composite	Maximum daily
Benzo(a)pyrene	2	—	Once per week	24-hour composite	Maximum daily
Dibenzo(a,h)anthracene	2	—	Once per week	24-hour composite	Maximum daily
Benzo(g,h,i)perylene	2	—	Once per week	24-hour composite	Maximum daily
Indeno(1,2,3-cd)pyrene	2	—	Once per week	24-hour composite	Maximum daily
Pentachlorophenol (d)	6	—	Once per week	24-hour composite	Maximum daily
Discharge Flow (gpm) (e)	NA	—	Continuous	Recording	Maximum daily
Total Suspended Solids [TSS] (mg/L)	NA	—	Once per week	24-hour composite	Maximum daily
Total Dissolved Solids [TDS] (mg/L)	NA	—	Once per week	Grab	Maximum daily
Temperature [degrees C]	NA	—	Once per week	Grab	Maximum daily
Dissolved Oxygen [DO] (mg/L)	NA	—	Once per week	Grab	Maximum daily
pH	6.0 - 9.0	—	Once per week	Grab	Maximum daily
Metals (f)					
Zinc	95	47	Once per week	24-hour composite	Maximum daily
Lead	140	70	Once per week	24-hour composite	Maximum daily
Mercury	2.1	1	Once per week	24-hour composite	Maximum daily
Nickel	75	37	Once per week	24-hour composite	Maximum daily
Cadmium	43	21	Once per week	24-hour composite	Maximum daily
Chromium (Total)	1100	548	Once per week	24-hour composite	Maximum daily

BIOMONITORING (g)

Organism	Type of Toxicity Test	Monitoring Requirements		
		Measurement Frequency	Sample Type	Reported Value(s)
Inland Silversides (Menidia beryllina)	Acute survival test	Quarterly	24-hour composite	NOEC, LOEC, LC50
Purple sea urchin or sand dollar (h)	Chronic test	Quarterly	24-hour composite	NOEC, LOEC, EC50
Pacific oyster or mussel larvae (h)	Chronic test	Quarterly	24-hour composite	NOEC, LOEC, EC50

Notes:

- (a) Modified from EPA's Administrative Order for Necessary Interim Response Actions No. 1091-06-03-106 dated June 17, 1991.
- (b) Each of the 16 priority pollutants PAHs are quantified separately using EPA Method 8310 from Test Methods for Evaluating Solid Waste, Third Edition, SW-846. The 16 individual PAHs are summed to arrive at the total PAH value.
- (c) A 24 hour composite sample is collected using an automatic sampler.
- (d) Pentachlorophenol is quantified using EPA Method 8040 from Test Methods for Evaluating Solid Waste, Third Edition, SW-846.
- (e) Flow is measured by a continuous flow meter.
- (f) Metals are quantified using EPA Contract Laboratory Program (CLP) analytical methods and QA/QC, however full documentation is not required. Documentation only includes calibration, blank, accuracy, and precision results.
- (g) Specific requirements for analytical methods, QA/QC, and reporting are provided in the attached fact sheet.
- (h) These organisms are used interchangeably depending upon seasonal availability.

Current Wyckoff Groundwater Treatment Plant Final Effluent Biomonitoring Requirements

I. Acute Toxicity Test Requirements:

1. For each test period (see also Paragraph I.8 below), acute survival toxicity tests are required for Inland Silversides (*Menidia beryllina*).
2. The test protocol is adapted from C.I. Weber, et al, *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*. EPA/600/4-90/027, 1991.
3. All quality assurance criteria used are in accordance with *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, EPA/600/4-90/027. Test results which are not valid (e.g., control mortality exceeds acceptable level) will not be accepted and must be repeated.
4. The test is performed with a series of dilutions (100, 50, 25, 12.5, and 6.25 percent effluent) plus a control (0 percent effluent) to determine (1) the LC₅₀, and (2) any statistically significant differences between the results for the control and each effluent concentration tested.
5. The presence of acute toxicity will be evaluated as follows: If there is no statistically significant difference in response between the ACEC¹ and a control, as determined by the acute statistical power standard², then the test passes.
6. A written report of the toxicity test results and any related source investigation are prepared for EPA within 60 days after the initial sampling. The report of the toxicity test results and chemical analyses shall be prepared in accordance with the Reporting Sections in the documents specified above in Section I-3.
7. Chemical testing for the parameters for which effluent limitations exist shall be performed on a split of each sample collected for bioassay testing. To the extent that the timing of sample collection coincides with that of the sampling required for the effluent limitations, analysis of the split sample will fulfill the requirements of that monitoring as well.

¹ Per WAC 173-205-020, the ACEC is the maximum concentration of effluent during critical conditions, i.e., those circumstances when the physical, chemical, and biological characteristics of the receiving water environment interact with the effluent to produce the greatest potential adverse impact on aquatic biota and existing and characteristic water uses, at the boundary of the zone of acute criteria exceedance (ten percent of the combined distance of 200 feet plus the depth of water over the discharge point at MLLW [WAC 173-201A-100(8(b))]).

² If the percent difference in survival between the control and the ACEC is equal to or less than 29%, then the test meets the acute statistical power standard.

8. Testing shall be conducted every three months (4 times per year), until EPA modifies this requirement in writing. Additional toxicity testing is also required at any time that spills or other unusual events result in different or substantially increased discharge of pollutants.

II. Chronic Toxicity Test Requirements:

1. For each test period (see also Paragraph II.11 below), chronic toxicity tests are required for the following organisms:
 - (a) *Strongylocentrotus purpuratus* (purple sea urchin), or *Dendraster excentricus* (sand dollar).
 - (b) *Mytilus Sp.* (mussel) or *Crassostrea gigas* (Pacific oyster) larvae.
2. Any tests which fail the criteria for control performance as specified in the respective protocols shall be repeated on a freshly collected sample.
3. Testing is conducted on 24-hour composite samples of effluent. Each composite sample collected shall be large enough to provide enough effluent to conduct toxicity tests, as well as chemical tests required in Part II.10. below.
4. The chronic toxicity tests are performed as follows:
 - (a) For the purple sea urchin/sand dollar, tests are performed on a series of dilutions, plus a control (0 percent effluent). The NOEC (no observable effect concentration), LOEC (lowest observable effect concentration), and EC50 (effective concentration [EC] at which 50 percent of the population shows sublethal effects such as reduction in growth) will be calculated for these tests.
 - (b) For the mussel or Pacific oyster larvae, tests are performed on a series of dilutions, plus a control (0 percent effluent). The NOEC, LOEC, and the EC50 will be calculated for these tests.
5. The chronic bioassays are conducted in accordance with the following protocols:
 - (a) For purple sea urchin/sand dollar: *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, EPA/600/4-87/028 and The Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1988, as per the protocols presented in the West Coast Marine Species Variability Study, prepared for the Washington State Department of Ecology (PTI, 1994).
 - (b) For mussel/Pacific oyster larvae: *Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs*, ASTM E 724-89, as per the protocols presented in the West Coast Marine

Species Variability Study, prepared for the Washington State Department of Ecology (PTI, 1994).

6. All quality assurance criteria used shall be in accordance with *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, EPA/600/4-85-013, *Quality Assurance Guidelines for Biological Testing*, EPA/600/4-78-043, and for oyster/mussel larvae test, *Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs*, ASTM E 724-89. The control water shall be high quality natural seawater. No exceptions will be made for artificial sea salts or concentrated brine unless Wyckoff submits data to EPA which demonstrates that the lab has reliably conducted the specified test with one of these media.
7. The results of the bioassay tests are provided to EPA within 45 days after completion of each test in accordance with the Reporting Section in *Short Term Methods for Estimating Chronic Toxicity Effluents and Receiving Water to Marine and Estuarine Organisms*, EPA/600/4-87/028, May 1988, and include any other information required by the protocols.
8. The presence of chronic toxicity will be evaluated as follows: If there is no statistically significant difference in response between the CCEC³ and a control, as determined by the chronic statistical power standard⁴, then the test passes.
9. If the sea urchin/sand dollar or mussel/oyster larvae tests prove inadequate for evaluating Wyckoff's effluent, EPA may substitute alternative tests which will provide the required toxicity information.
10. Chemical testing for the parameters for which effluent limitations exist shall be performed on a split of each sample collected for bioassay testing. To the extent that the timing of sample collection coincides with that of the sampling required for the effluent limitations, analysis of split sample will fulfill the requirements of that monitoring as well.
11. After one year, EPA may reduce the monitoring requirements to once per year, using the more sensitive species. All modifications will be approved by EPA in writing.

³ Per WAC 173-205-020, the CCEC is the maximum concentration of effluent during critical conditions, i.e., those circumstances when the physical, chemical, and biological characteristics of the receiving water environment interact with the effluent to produce the greatest potential adverse impact on aquatic biota and existing and characteristic water uses, at the boundary of the mixing zone.

⁴ If the percent difference in response between the control and the CCEC is equal to or less than 39%, then the test meets the chronic statistical power standard.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

October 23, 1996

Reply To
Attn Of: ECL-115

MEMORANDUM

SUBJECT: Changes in the Wyckoff Groundwater Treatment Plant Effluent Compliance Monitoring Program

FROM: Christina Ngo *Christina Ngo*
Work Assignment Manager

TO: Susan Moore, CH2M HILL
Ken Scheffler, CH2M HILL

CC: Laura Castrilli, OEA-095
Bruce Woods, OEA-095

The purpose of this memorandum is to inform you of the official changes to the Wyckoff Groundwater Treatment Plant effluent compliance monitoring program (weekly discharge monitoring and quarterly bioassay testing). As you know, two requests were made to the Washington State Department of Ecology and Department of Natural Resources to modify the current compliance monitoring program, as specified in the Interim Record of Decision (September 1994). The first request proposes to eliminate metals analysis from the weekly effluent compliance program. The second request proposes to reduce the biomonitoring requirements by eliminating one of the chronic tests (echinoderm) and reduce the frequency of the acute tests (inland silversides).

Both the Department of Ecology and Department of Natural Resources concur with EPA's requests, therefore, the following shall be effective immediately. CH2M HILL shall notify the appropriate staff and personnel of the changes and shall plan the FY97 biomonitoring work accordingly :

1. Eliminate metals (zinc, lead, mercury, nickel, cadmium, chromium-total) analysis from the weekly compliance monitoring program. Please notify the Manchester Lab that this work is no longer required.

2. Acute testing frequency of the Inland Silversides be reduced to once per year. Based on knowledge of site/process conditions and historical effluent data, and to the extent possible, this test should coincide with the period of year where effluents have been shown to have the highest discharge concentration of the compound presenting the greatest sensitivity to this species. CH2M HILL will make the determination regarding when during the year this test should occur and make recommendations to EPA.

3. Eliminate the Echinoderm test from the chronic toxicity testing requirements. However, quarterly chronic tests will continue using the Bivalves since they are more sensitive of the two species.

In conclusion, the above changes to the Wyckoff Groundwater Treatment Plant effluent compliance monitoring program shall be maintained throughout the life of the current treatment plant (thru Summer 1998). It is anticipated that acute and chronic testing requirements will resume the status quo program for at least a minimum of one year following construction and operation of the replacement treatment plant.

Please feel free to contact me if you have questions.